

Surname		Other Names	
Centre Number			Candidate Number
Candidate signature			

General Certificate of Secondary Education  
Specimen Paper

**SCIENCE A**  
**Unit 1b Physics (Radiation and the Universe)**

PHY1B



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

**PHYSICS**  
**Unit 1b Physics (Radiation and the Universe)**

Date and Time

**For this paper you must have:**

- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

Time allowed: 30 minutes

### Instructions

- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title 'Radiation and the Universe' printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only.
- Do all rough work in this book, **not** on your answer sheet.

### Instructions for recording answers

- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

### Information

- The maximum mark for this paper is 36.

### Advice

- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

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You must do **one Tier** only, **either** the Foundation tier **or** the Higher Tier.  
The Higher Tier starts on page 16 of this booklet.

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## FOUNDATION TIER

### SECTION ONE

Questions **ONE** to **SIX**.

In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1 – 4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

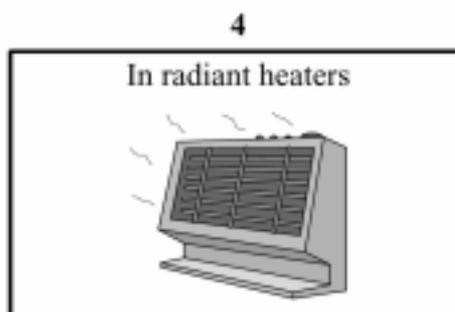
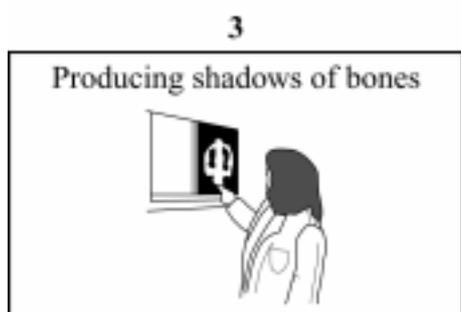
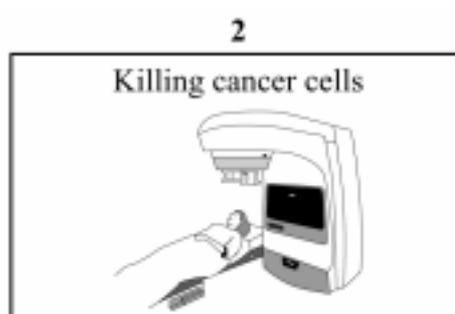
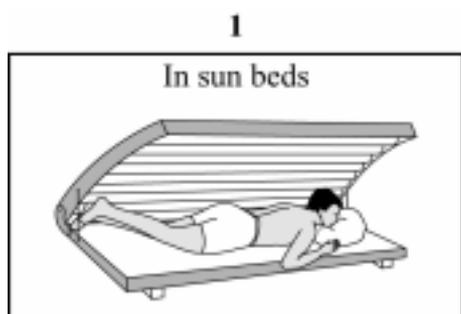
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### QUESTION ONE

We use electromagnetic radiation for many different jobs.

Match words, **A**, **B**, **C** and **D**, with the drawings labelled **1 – 4**.

- A** gamma rays
- B** infra red waves
- C** ultraviolet waves
- D** x-rays



**QUESTION TWO**

Electromagnetic waves can be grouped into types with different wavelengths.

Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the table.

- A**    infra red waves
- B**    microwaves
- C**    ultraviolet waves
- D**    X-rays

**Increasing wavelength** 

gamma rays	<b>1</b>	<b>2</b>	visible light	<b>3</b>	<b>4</b>	radio waves
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**Turn over for the next question**

**QUESTION THREE**

The diagram shows a mobile phone.



Match words, **A**, **B**, **C** and **D**, with the numbers **1** – **4** in the sentences.

- A** a digital
- B** a microphone
- C** an analogue
- D** microwave radiation

When we talk into the phone, the sound is detected by . . . **1** . . . .

Sound is . . . **2** . . . signal.

The phone converts this type of signal into . . . **3** . . . signal.

The signal is then transmitted from the antenna in the form of . . . **4** . . . .

**QUESTION FOUR**

The table gives information about five radioactive isotopes.

Match statements, **A**, **B**, **C** and **D**, with the numbers **1** – **4** in the table.

- A** the isotope which does not damage the body from the outside
- B** the isotope which gives off the most penetrating type of radiation
- C** the isotope with the longest half-life
- D** the isotope with the smallest mass

	<b>Isotope</b>	<b>Type of radiation emitted</b>	<b>Half-life</b>
<b>1</b>	Californium-241	alpha ( $\alpha$ )	4 minutes
<b>2</b>	Cobalt-60	gamma ( $\gamma$ )	5 years
<b>3</b>	Hydrogen-3	beta ( $\beta$ )	12 years
<b>4</b>	Strontium-90	beta ( $\beta$ )	28 years

**Turn over for the next question**

**QUESTION FIVE**

Electromagnetic radiation can damage our bodies if it is not used correctly.

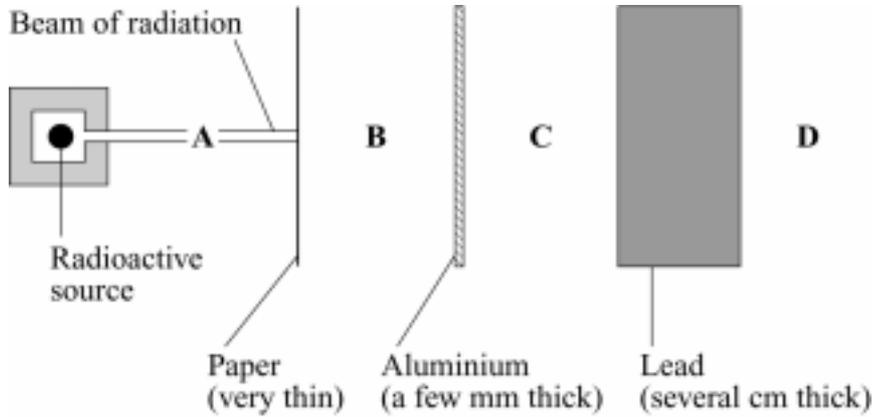
Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the table.

- A** infra red radiation
- B** microwaves
- C** ultraviolet radiation
- D** X-rays

	<b>Damage caused to body</b>
<b>1</b>	burns
<b>2</b>	damages cells by heating water inside them
<b>3</b>	damage to unborn children by causing mutations
<b>4</b>	skin cancer

**QUESTION SIX**

A radioactive source gives out a narrow beam of radiation.  
Barriers are placed in front of the source as shown in the diagram.



Readings are taken from a radiation detector at **A**, **B**, **C** and **D**.

These readings are shown in the table.

Position of detector	Reading on detector
<b>A</b>	280
<b>B</b>	136
<b>C</b>	98
<b>D</b>	0

Match the counts, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the table.

	Types of radiation
<b>1</b>	gamma radiation only
<b>2</b>	gamma radiation and beta particles
<b>3</b>	gamma radiation, alpha particles and beta particles
<b>4</b>	no radiation

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**SECTION TWO**Questions **SEVEN** to **NINE**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

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**QUESTION SEVEN**

We have obtained evidence for the origin of the Universe by studying light coming to us from bodies in the Universe.

**7A** From which bodies do we get light that gives evidence for the origin of the Universe?

- 1 comets
- 2 galaxies
- 3 moons
- 4 planets

**7B** The light coming from these bodies changes wavelength.

This change is known as . . .

- 1 blue shift.
- 2 green shift.
- 3 red shift.
- 4 yellow shift.

**7C** This shift shows us that distant galaxies . . .

- 1 are moving away from us.
- 2 are moving in orbits.
- 3 are moving towards us.
- 4 are stationary.

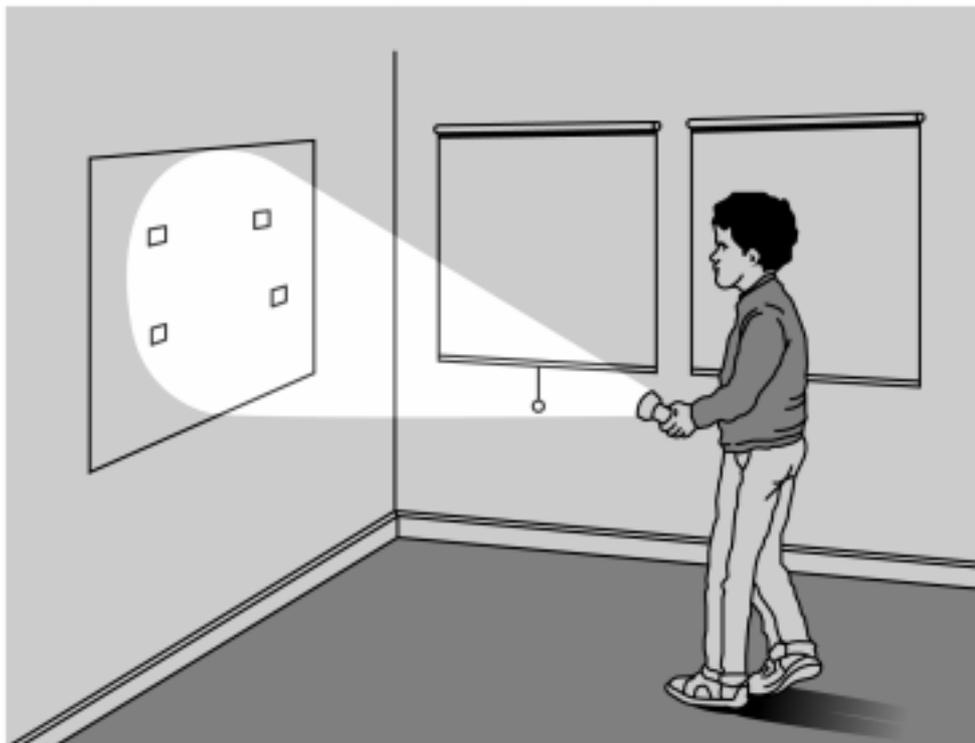
**7D** This shift gives evidence for . . .

- 1** global warming.
- 2** life on other planets.
- 3** the Big Bang theory.
- 4** the theory of evolution.

**Turn over for the next question**

**QUESTION EIGHT**

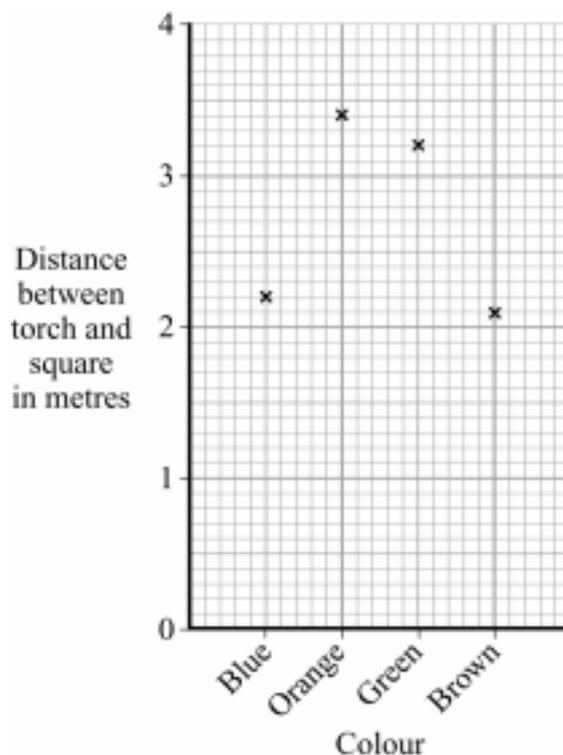
To be seen walking along the road on a dark night, it is important to wear clothing which will reflect light from car headlamps. Isaac investigated which colours are best at reflecting light.



- He stuck small squares of different coloured material on to a black card.
- He hung the card at one end of a darkened laboratory.
- He switched on his torch and moved towards the coloured squares.
- When he could clearly see a coloured square, he measured the distance between the torch and that coloured square with a measuring tape graduated to 2 cm.
- He then repeated the technique to find the distance for the other coloured squares.

**Question 8 continues on the next page**

The graph shows Isaac's results.



**8A** Which of these colours would it be best to use for a reflective coat?

- 1 blue
- 2 brown
- 3 green
- 4 orange

**8B** Why did Isaac do the investigation in a darkened room?

- 1 because colours show up better in torchlight
- 2 because reflective clothing is used at night
- 3 so that only the light from the torch lit up the coloured squares
- 4 to make it a fair test

**8C** Which of the following is a control variable in this experiment?

- 1 the distance between the torch and the board
- 2 the length of time the torch was switched on
- 3 the colour of the coloured squares
- 4 the size of the coloured squares

**8D** Isaac could have got more reliable results by using . . .

- 1 a light meter.
- 2 a metre rule graduated to 1 mm.
- 3 a stop clock.
- 4 binoculars.

**Turn over for the next question**

**QUESTION NINE**

Read the passage below about mobile phones.

The number of mobiles in Britain has doubled to 50 million since the first government-sponsored report in 2000. The number of children aged between five and nine using mobiles has increased fivefold in the same period.

Four studies have caused concern.

A Swedish study suggests that heavy mobile users are more likely to get cancer in the ear and brain.

A Dutch study suggests that there are changes in brain function in heavy mobile phone users. A German study found some evidence of an increase in cancer around transmitter masts.

An EU study has shown evidence of cell damage from waves similar to those transmitted by mobile phones.

A British scientist, Sir William Stewart, said, "All of these studies have yet to be replicated but we can't dismiss them out of hand. If there was a health risk it would have a greater effect on the young than on older people".

- 9A** How has the number of mobile phones used by children aged between five and nine changed since 2000?
- 1 it has doubled
  - 2 it has risen fivefold
  - 3 it has risen by 50 million
  - 4 it has risen to 50 million
- 9B** What is a possible effect of waves from mobile phone masts on people living near them?
- 1 cancer
  - 2 changes in brain function
  - 3 non-malignant brain tumours
  - 4 non-malignant ear tumours

**9C** Why has Sir William advised that children under eight should not use mobiles phones?

- 1 Mobile phones affect the brain.
- 2 Mobile phones cause brain tumours.
- 3 Mobile phones cause cancer.
- 4 Mobile phones might have a greater effect on young people than on older people.

**9D** The link between mobile phones and health risk . . .

- 1 cannot be proved.
- 2 has been proved.
- 3 needs research results to be replicated to be more certain.
- 4 will never be proved.

**END OF TEST**

You must do **one Tier** only, **either** the Foundation tier **or** the Higher Tier.  
The Foundation Tier is earlier in this booklet.

## HIGHER TIER

### SECTION ONE

Questions **ONE** and **TWO**

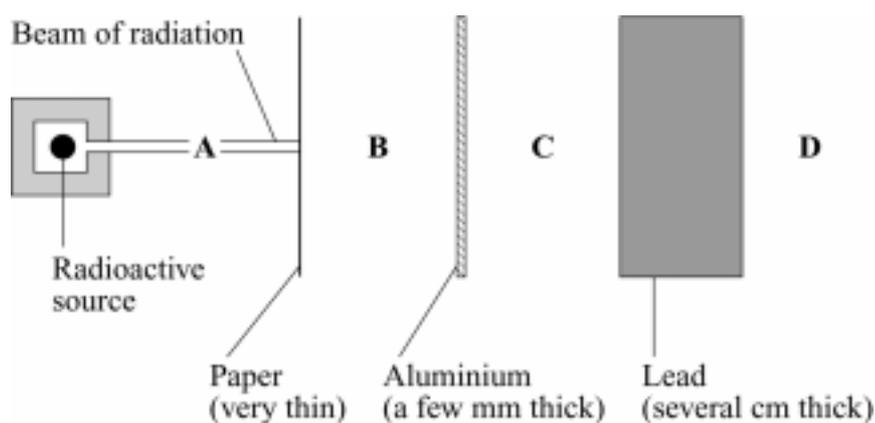
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1 – 4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

#### QUESTION ONE

A radioactive source gives out a narrow beam of radiation.  
Barriers are placed in front of the source as shown in the diagram.



Readings are taken from a radiation detector at **A**, **B**, **C** and **D**.

These readings are shown in the table.

Position of detector	Reading on detector
<b>A</b>	280
<b>B</b>	136
<b>C</b>	98
<b>D</b>	0

Match the counts, **A**, **B**, **C** and **D**, with the words **1** – **4** in the table.

	<b>Types of radiation</b>
<b>1</b>	gamma radiation only
<b>2</b>	gamma radiation and beta particles
<b>3</b>	gamma radiation, alpha particles and beta particles
<b>4</b>	no radiation

## QUESTION TWO

The table gives types of electromagnetic waves.

Match wavelengths, **A**, **B**, **C** and **D**, with the numbers **1** – **4** in the table.

**A**      0.0005 mm

**B**      0.1 mm

**C**      10 cm

**D**      1000m

	<b>Electromagnetic wave</b>
<b>1</b>	infra red
<b>2</b>	light
<b>3</b>	microwaves
<b>4</b>	radio

**SECTION TWO**

Questions **THREE** to **NINE**.

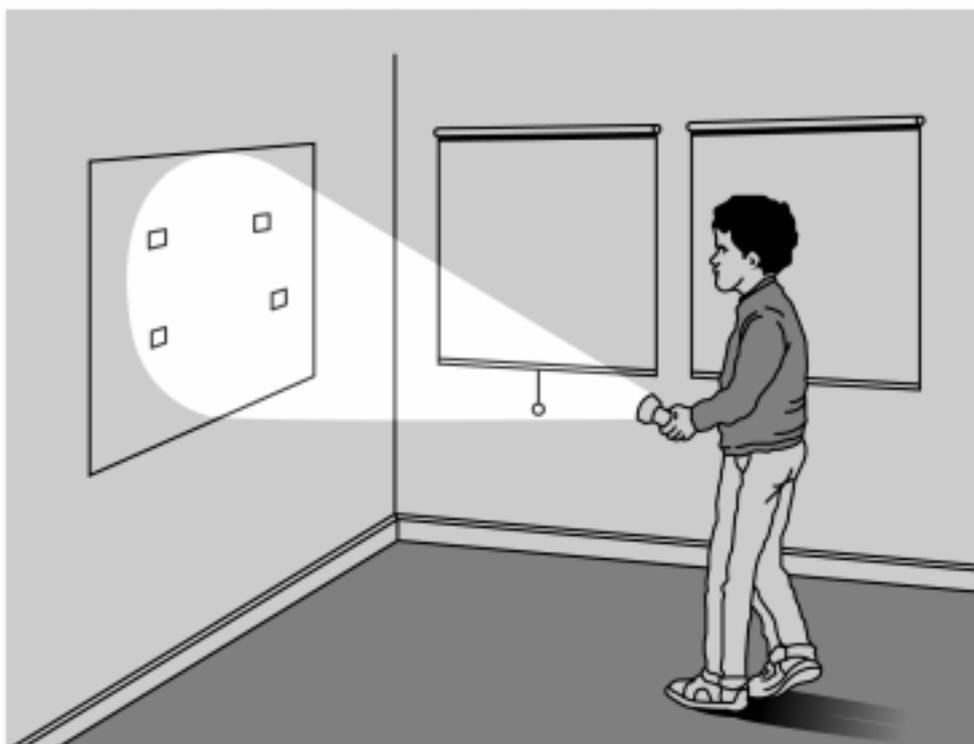
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

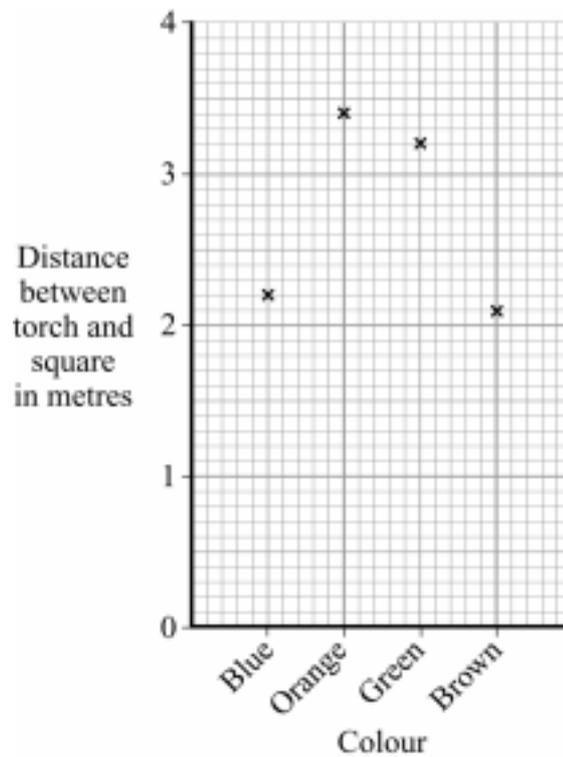
**QUESTION THREE**

To be seen walking along the road on a dark night, it is important to wear clothing which will reflect light from car headlamps. Isaac investigated which colours are best at reflecting light.



- He stuck small squares of different coloured material on to a black card.
- He hung the card at one end of a darkened laboratory.
- He switched on his torch and moved towards the coloured squares.
- When he could clearly see a coloured square, he measured the distance between the torch and that coloured square with a measuring tape graduated to 2 cm.
- He then repeated the technique to find the distance for the other coloured squares.

The graph shows Isaac's results.



**3A** Which of these colours would it be best to use for a reflective coat?

- 1 blue
- 2 brown
- 3 green
- 4 orange

**3B** Why did Isaac do the investigation in a darkened room?

- 1 because colours show up better in torchlight
- 2 because reflective clothing is used at night
- 3 so that only the light from the torch lit up the coloured squares
- 4 to make it a fair test

**Question 3 continues on the next page**

**3C** Which of the following is a control variable in this experiment?

- 1 the distance between the torch and the board
- 2 the length of time the torch was switched on
- 3 the colour of the coloured squares
- 4 the size of the coloured squares

**3D** Isaac could have got more reliable results by using . . .

- 1 a light meter.
- 2 a metre rule graduated to 1 mm.
- 3 a stop clock.
- 4 binoculars.

**Turn over for the next question**

**QUESTION FOUR**

Read the passage below about mobile phones.

The number of mobiles in Britain has doubled to 50 million since the first government-sponsored report in 2000. The number of children aged between five and nine using mobiles has increased fivefold in the same period.

Four studies have caused concern.

A Swedish study suggests that heavy mobile users are more likely to get cancer in the ear and brain.

A Dutch study suggests that there are changes in brain function in heavy mobile phone users. A German study found some evidence of an increase in cancer around transmitter masts.

A EU study has shown evidence of cell damage from waves similar to those transmitted by mobile phones.

A British scientist, Sir William Stewart, said, "All of these studies have yet to be replicated but we can't dismiss them out of hand. If there was a health risk it would have a greater effect on the young than on older people".

- 4A** How has the number of mobile phones used by children aged between five and nine changed since 2000?
- 1 it has doubled
  - 2 it has risen fivefold
  - 3 it has risen by 50 million
  - 4 it has risen to 50 million
- 4B** What is a possible effect of waves from mobile phone masts on people living near them?
- 1 Cancer
  - 2 Changes in brain function
  - 3 Non-malignant brain tumours
  - 4 Non-malignant ear tumours

**4C** Why has Sir William advised that children under eight should not use mobile phones?

- 1 Mobile phones affect the brain.
- 2 Mobile phones cause brain tumours.
- 3 Mobile phones cause cancer.
- 4 Mobile phones might have a greater effect on young people than on older people.

**4D** The link between mobile phones and health risk . . .

- 1 cannot be proved.
- 2 has been proved.
- 3 needs research results to be replicated to be more certain.
- 4 will never be proved.

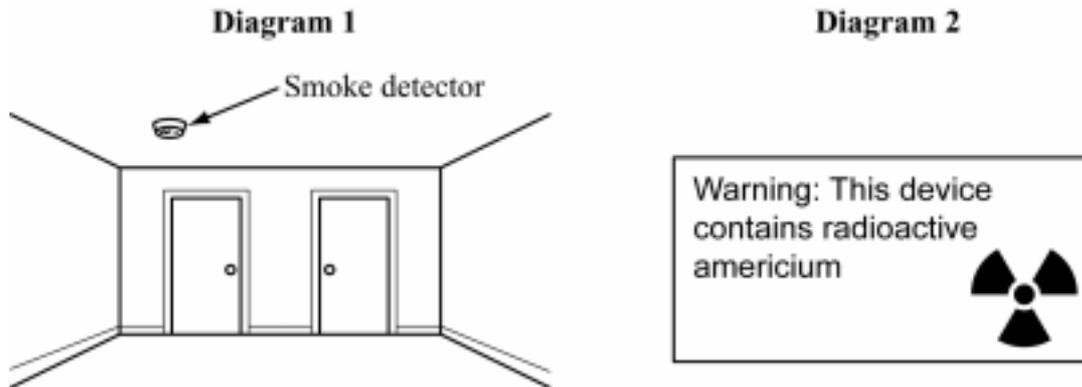
**Turn over for the next question**

### QUESTION FIVE

A smoke detector uses the radioactive element americium. Americium gives radiation in the form of alpha particles.

**Diagram 1** shows the position of the smoke detector in a room.

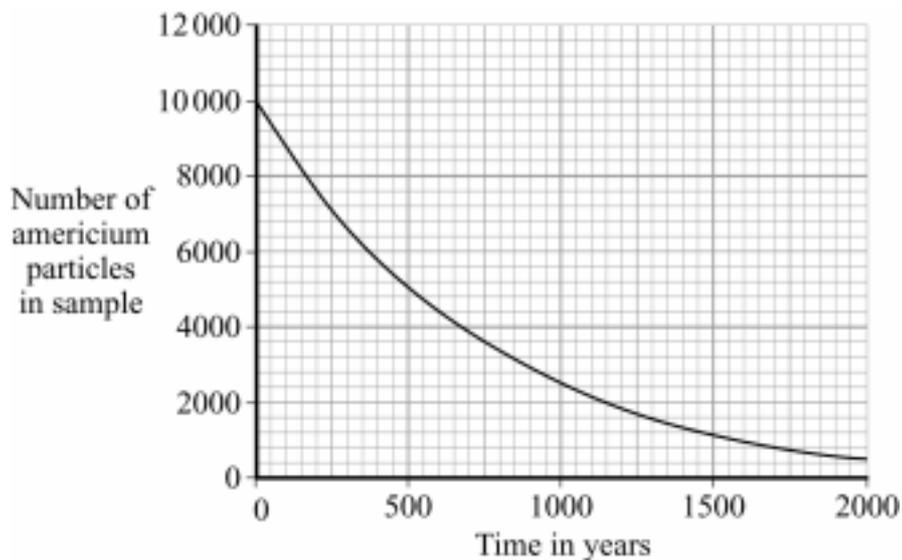
**Diagram 2** shows the warning label at the back of the smoke detector.



**5A** The radiation from the americium in the smoke detector will not harm people in the room because . . .

- 1 alpha particles cannot cause mutations.
- 2 alpha particles cannot damage human cells.
- 3 alpha particles do not cause ionisation.
- 4 alpha particles travel only a few centimetres in air.

The graph shows how the number of americium particles inside a source changes with time.



**5B** How long does it take for the number of americium particles to fall to 2500?

- 1 500 years
- 2 1000 years
- 3 1500 years
- 4 2000 years

**5C** What proportion of the americium particles were left after 500 years?

- 1 one eighth
- 2 one quarter
- 3 a half
- 4 three quarters

**5D** The battery in the smoke detector needs to be changed regularly, but the americium never needs to be changed.

This is because . . .

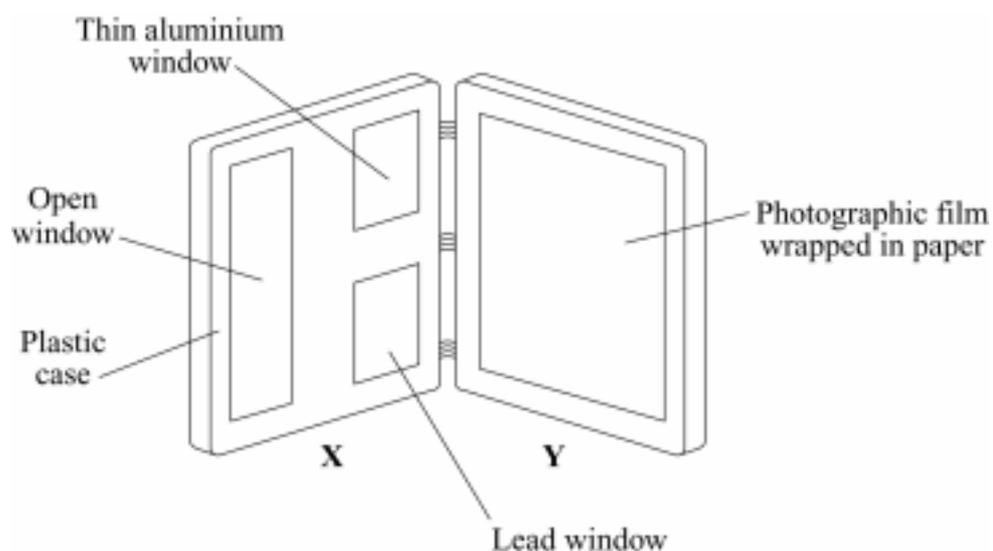
- 1 americium has a very long half-life.
- 2 americium only gives off weak radiation.
- 3 long-life batteries cannot be used in smoke alarms.
- 4 radiation is stronger than electricity.

**Turn over for the next question**

**QUESTION SIX**

The diagram shows a film badge worn by people who work with radioactive materials. The badge has been opened.

The badge is used to measure the amount of radiation to which the workers have been exposed.



The detector is a piece of photographic film wrapped in paper inside part Y of the badge. Part X has “windows” as shown.

**6A** Which type(s) of radiation can pass through the open window and affect the film.

- 1 alpha radiation only
- 2 alpha radiation and beta radiation
- 3 beta radiation and gamma radiation
- 4 gamma radiation only

**6B** Which type(s) of radiation can pass through the lead window and affect the film.

- 1 alpha radiation only
- 2 alpha radiation and beta radiation
- 3 beta radiation and gamma radiation
- 4 gamma radiation only

**6C** Alpha radiation consists of . . .

- 1 electrons only.
- 2 helium nuclei.
- 3 neutrons only.
- 4 protons only.

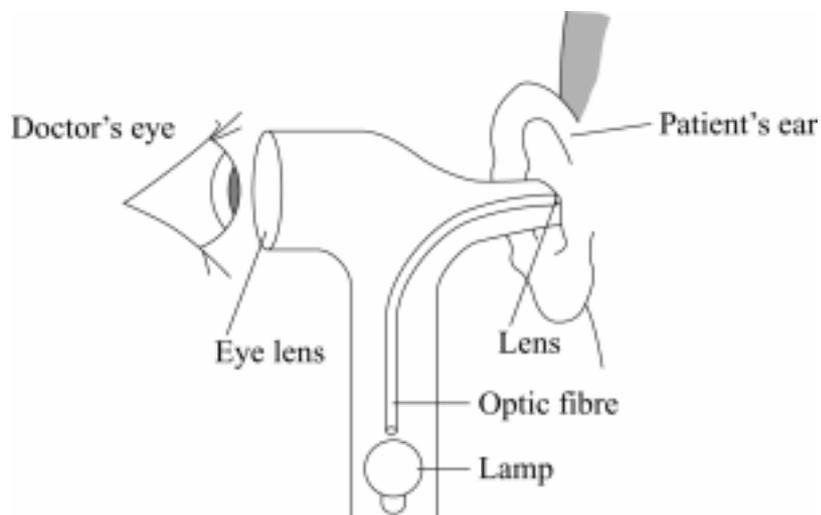
**6D** Beta radiation consists of . . .

- 1 electrons only.
- 2 helium nuclei.
- 3 neutrons only.
- 4 protons only.

**Turn over for the next question**

**QUESTION SEVEN**

Doctors use endoscopes to examine the inside of the body. Endoscopes contain optical fibres.



**7A** The light wave stays inside the fibre . . .

- 1 because it is absorbed.
- 2 because it is an analogue wave.
- 3 because it is a digital wave.
- 4 because it is reflected.

**7B** Which other type of radiation is commonly used to transmit information along optical fibres?

- 1 gamma
- 2 infra red
- 3 microwaves
- 4 ultraviolet

**7C** A signal which varies continually in amplitude is known as . . .

- 1 a digital signal.
- 2 a musical signal.
- 3 a noisy signal.
- 4 an analogue signal.

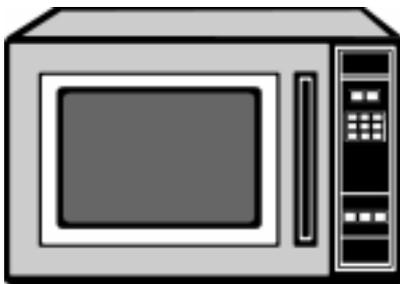
**7D** Digital signals are less prone to interference than analogue signals because . . .

- 1 only analogue signals get weaker as they travel.
- 2 only analogue signals need to be amplified.
- 3 only analogue systems pick up noise.
- 4 only digital systems can ignore noise.

**Turn over for the next question**

**QUESTION EIGHT**

Microwave ovens can be used to heat many types of food.



**8A** When microwaves are absorbed by water in the food, the energy from the microwave is converted into . . .

- 1 electrical energy.
- 2 kinetic energy.
- 3 light energy.
- 4 sound energy.

**8B** Microwaves can be dangerous to humans because they cause . . .

- 1 cells to heat up.
- 2 ionisation.
- 3 mutations.
- 4 skin cancer.

**8C** Microwaves travel at a speed of 300 million m/s. Their wavelength is 0.03 m.

What is the frequency of these microwaves?

**1** 1 million Hz

**2** 10 million Hz

**3** 1 000 million Hz

**4** 10 000 million Hz

**8D** What speed do gamma rays travel at?

**1** a higher speed than microwaves

**2** a lower speed than microwaves

**3** the same speed as microwaves

**4** it is impossible to measure the speed of gamma rays

**Turn over for the next question**

**QUESTION NINE**

**9A** Scientists are able to look at distant galaxies and planets due to technological advances.

Which instrument has helped them look the farthest into the Universe?

- 1 ground-based observatories
- 2 hubble telescope
- 3 space probes
- 4 space shuttle

**9B** Measurements of light from seven nearby stars were made. Red shift was observed in all the measurements.

What does this evidence suggest about the stars?

- 1 All the stars measured are moving away from the Earth.
- 2 All the stars measured are moving towards the Earth.
- 3 None of the stars are moving relative to the Earth.
- 4 Some stars could be moving towards the Earth and some could be moving away from the Earth.

**9C** Which of the following statements gives the best reason for the Big Bang theory being an accepted scientific theory?

- 1 A group of people met together and decided to make it a theory.
- 2 Distant galaxies were observed to be moving away from Earth.
- 3 Edwin Hubble was an honest man.
- 4 There is no other way to explain the formation of the Universe.

**9D** Why is the Big Bang theory the most accepted theory of how the Universe was formed?

- 1 It has been proven correct by using mathematical models.
- 2 It has not been revised or changed by scientists for many years.
- 3 It is based on a combination of scientific and religious facts.
- 4 It is the simplest explanation of the current scientific data.

**END OF TEST**

# FOUNDATION TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

## QUESTION ONE

	1	2	3	4
A gamma rays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B infra red waves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C ultraviolet waves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D x-rays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION TWO

	1	2	3	4
A infra red waves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B microwaves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C ultraviolet waves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D x-rays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION THREE

	1	2	3	4
A a digital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B a microphone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C an analogue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D microwave radiation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION FOUR

	1	2	3	4
A the isotope which does not damage the body from the outside	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B the isotope which gives off the most penetrating type of radiation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C the isotope with the longest half-life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D the isotope with the smallest mass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION FIVE

	1	2	3	4
A infra red radiation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B microwaves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C ultraviolet radiation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D x-rays	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION SIX

	1	2	3	4
A 280	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B 136	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C 98	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D 0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION SEVEN

	1	2	3	4
A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION EIGHT

	1	2	3	4
A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## QUESTION NINE

	1	2	3	4
A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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**Unit : PHY1B – Physics 1b**

Date/Series :

**Centre :**

**Candidate Number :**

**UCI :**

**Candidate Name :**

*For completion by the Examination Invigilator.* Please fill this oval if the candidate is absent:

**HIGHER TIER**

▶ Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully. ◀

QUESTION ONE					1	2	3	4
A	280				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	136				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	98				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	0				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

QUESTION TWO					1	2	3	4
A	0.0005 mm				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
B	0.1 mm				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
C	10 cm				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	1000m				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

QUESTION THREE					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION FOUR					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION FIVE					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION SIX					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION SEVEN					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION EIGHT					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

QUESTION NINE					1	2	3	4
A		<input type="radio"/>						
B		<input type="radio"/>						
C		<input type="radio"/>						
D		<input type="radio"/>						

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**GCSE**  
**SCIENCE A (4461)/PHYSICS (4451)**  
Objective Test Answer Key  
**PHY1B (Radiation and the Universe)**  
**Specimen Paper**  
Foundation Tier

Question	Key			
One	<b>A</b>	gamma rays	<b>2</b>	
	<b>B</b>	infra red waves	<b>4</b>	
	<b>C</b>	ultraviolet waves	<b>1</b>	
	<b>D</b>	X-rays	<b>3</b>	
Two	<b>A</b>	infra red waves	<b>3</b>	
	<b>B</b>	microwaves	<b>4</b>	
	<b>C</b>	ultraviolet waves	<b>2</b>	
	<b>D</b>	X-rays	<b>1</b>	
Three	<b>A</b>	a digital	<b>3</b>	
	<b>B</b>	a microphone	<b>1</b>	
	<b>C</b>	an analogue	<b>2</b>	
	<b>D</b>	microwave radiation	<b>4</b>	
Four	<b>A</b>	the isotope which does not damage the body from the outside	<b>1</b>	
	<b>B</b>	the isotope which gives off the most penetrating type of radiation	<b>2</b>	
	<b>C</b>	the isotope with the longest half-life	<b>4</b>	
	<b>D</b>	the isotope with the smallest mass	<b>3</b>	
Five	<b>A</b>	infra red radiation	<b>1</b>	
	<b>B</b>	microwaves	<b>2</b>	
	<b>C</b>	ultraviolet radiation	<b>4</b>	
	<b>D</b>	X-rays	<b>3</b>	
Six	<b>A</b>		<b>3</b>	
	<b>B</b>		<b>2</b>	
	<b>C</b>		<b>1</b>	
	<b>D</b>		<b>4</b>	
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Seven	<b>2</b>	<b>4</b>	<b>1</b>	<b>3</b>
Eight	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>
Nine	<b>1</b>	<b>1</b>	<b>4</b>	<b>3</b>

**GCSE**  
**SCIENCE A (4461)/PHYSICS (4451)**  
Objective Test Answer Key  
**PHY1B (Radiation and the Universe)**  
**Specimen Paper**  
Higher Tier

Question	Key			
One	<b>A</b>	<b>3</b>		
	<b>B</b>	<b>2</b>		
	<b>C</b>	<b>1</b>		
	<b>D</b>	<b>4</b>		
Two	<b>A</b>	0.0005 mm	<b>2</b>	
	<b>B</b>	0.1 mm	<b>1</b>	
	<b>C</b>	10 cm	<b>3</b>	
	<b>D</b>	1000 m	<b>4</b>	
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Three	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>
Four	<b>1</b>	<b>1</b>	<b>4</b>	<b>3</b>
Five	<b>4</b>	<b>2</b>	<b>3</b>	<b>1</b>
Six	<b>3</b>	<b>4</b>	<b>2</b>	<b>1</b>
Seven	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>
Eight	<b>2</b>	<b>1</b>	<b>4</b>	<b>3</b>
Nine	<b>2</b>	<b>1</b>	<b>2</b>	<b>4</b>